

Simultaneous Observations of Electric and Magnetic Field Variations near the Magnetic Equator during Substorms

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In order to understand transfer mechanisms of global electro-magnetic field variations from the polar region to the equatorial latitude, we carried out coordinated observations of electric field by means of FM/CW HF radar at Cebu(MLAT=1.70, MLONG=195.02), and magnetic fields at the Circum-pan Pacific Magnetometer Network (CPMN) stations during the WestPac campaign (February-March, 1999).

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The radar reflections of 2.5-11 MHz frequency range are expected to occur at ionospheric heights of 100-600 km in the equatorial region. From temporal variations of the reflection heights of radio-waves emitted every 5 min., we can estimate apparent upward/downward velocity (i.e. about within 60 m/s) and deduce the ionospheric electric-field variation in the east/west direction, especially, near the magnetic equatorial region.

The peculiarities of the simultaneous electric and magnetic field observations near the magnetic equator can be summarized as follows;

(1) DP2 and sc/si-associated longer-period (than 10 min.) magnetic variations in the daytime are found to accompany correlated electric-field variations at the equatorial station in the daytime and also in night-time (Shinohara et al., 2000).

(2) On the other hand, magnetic positive-bay variations observed at the night-side low-latitude stations during substorms are also found to accompany associated electric-field variations in night-time, but not so clear in the daytime.

The observational result (2) indicates a possibility of penetration of substorm-associated electric field from the auroral to the equatorial latitude in the night-side ionosphere and/or into the inner plasmasphere. In future we will re-construct a new scenario of plasma dynamics and a formation of global three dimensional current system during substorms.